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Evaluation of COVID-19-related fear/stress and associated factors in patients with axial spondyloarthritis and rheumatoid arthritis

COVID fear and stress in rheumatic diseases

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Abstract

Aim: In this study, we aimed to evaluate COVID-19-related fear and stress in individuals with axial spondyloarthritis and rheumatoid arthritis and their relationship with clinical and psychological factors.

Material and Methods: The study included patients diagnosed with axial spondyloarthritis (axSpA; n = 69) and rheumatoid arthritis (RA; n = 31). Demographic information, clinical characteristics, laboratory results, and COVID-19 vaccination data of all patients were recorded. Fear and stress due to COVID-19, quality of life (QoL), anxiety, depression, and disease activity were assessed with appropriate questionnaires/scales.

Results: The fear of COVID-19 scores had a weak significant correlation with RA quality of life (RAQoL), anxiety, depression, and vaccine doses. While the COVID stress scores showed a moderate correlation with RAQoL, they had a weak correlation with disease activity and disease duration of RA, age, body mass index (BMI), and anxiety. In linear regression analyses, anxiety was the only predictor with a significant effect on the scores of both COVID-19 fear and stress. Total number of vaccine doses and age were predictors of the fear of COVID-19 scores and the COVID stress scores, respectively.

Discussion: Anxiety affected fear and stress related to coronavirus disease, while the number of vaccine doses and age might differentially affect these two negative emotions.

Keywords

Anxiety, COVID-19, Pandemic, Psychological Processes, Rheumatic Diseases

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Introduction

The disease named Coronavirus Disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2, first appeared in December 2019 in Wuhan, China [1]. In March 2021, the World Health Organization declared this infection a global pandemic. Afterwards, the virus spread rapidly all over the world in multiple waves, infecting millions of people and causing the death of some [2].

A wide spectrum of clinical signs and symptoms has been observed in COVID-19 infection, ranging from asymptomatic or mild flu-like presentation to severe clinical image that requires hospitalization and respiratory support, or even death. Some risk factors identified in the general population and associated with worse outcomes are advanced age, gender, and the presence of chronic disease [3]. In this context, comorbidities in individuals with or without rheumatic diseases (RDs) significantly affect the prognosis of COVID-19 infection [4]. At the time of the first outbreak of the COVID-19 pandemic, there were concerns that the immunological changes in RDs and the medication used for treatment would worsen the outcomes of COVID-19 infection. After the introduction of vaccines, this concern has been replaced by a different one: the possibility of lower seroconversion rates in RDs through a similar mechanism [5].

Studies on COVID-19 are not limited to clinical-related topics, such as disease processes or mortality, but other topics have been studied, for example, its effects on psychological health. Since the beginning of the pandemic, survey studies have shown that many people face problems that threaten individual health, such as fear of contracting COVID-19 disease, anxiety, depression, and posttraumatic stress disorder [2]. To better understand the effects of the COVID-19 pandemic on mental health, different scales have been developed worldwide, including the fear of the COVID-19 scale and the COVID stress scale, which have been validated in Turkish [6-8].

Therefore, the current study aimed to evaluate COVID-related fear and stress, as well as their associations with disease activity, QoL, anxiety, depression, hospital visits, and COVID-19 vaccination status in patients with axial spondyloarthritis (axSpA) and rheumatoid arthritis (RA). As far as we know, our study is the first to measure the impact of COVID-19 on mental health symptoms with two different scales and to address other factors that may affect the results of these scales.

Material and Methods

Study population

This study had a cross-sectional design and was conducted between January 2022 and June 2022 in the Department of Rheumatology, Faculty of Medicine, Erciyes University. Patients with axSpA meeting the 2009 classification criteria of the Assessment in Spondyloarthritis International Society and patients meeting the 2010 RA classification criteria of the American College of Rheumatology and the European League Against Rheumatism were included in the study. Demographic features, disease and treatment-related data (rheumatic diagnosis, disease duration, and medication), comorbidities, smoking status, and COVID-19 vaccination information of all patients were recorded. Laboratory data to calculate disease activity scores [erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP)] were documented. The number of outpatient clinic visits between March 1, 2020 and December 31, 2021 was calculated for each patient. The exclusion criteria were the following: age < 18, a diagnosis of neurological and/or psychiatric disease, and incomplete laboratory data.

Measurements

Disease activity

The bath ankylosing spondylitis disease activity index (BASDAI) and the ankylosing spondylitis disease activity score (ASDAS) were used to evaluate disease activity in axSpA patients. On the other hand, the disease activity score (DAS)-28, the clinical disease activity index (CDAI), and the simplified disease activity index (SDAI) were calculated in the case of RA.

QoL

QoL of axSpA and RA patients was assessed with ASQoL [9] and RAQoL [10], respectively. In addition, the short form-36 (SF-36) was used as a common QoL scale for both groups. Eight SF-36 subheadings, summarized under two headings as physical and mental component summary (PCS and MCS for short, respectively), were evaluated as previously described [11].

Hospital Anxiety and Depression Scale (HADS)

This 4-point Likert scale contains 7 questions for each component, i.e., anxiety and depression. Total scores of 0–7 represent "normal", 8–10 "suspicious conditions", and ≥11 "abnormal" [12].

The fear of COVID-19 scale

It evaluates the fear of COVID-19 using 7 items and has been validated in Turkish [13]. It is a Likert-type scale with five options in each question (1: "strongly disagree"; 5: "strongly agree") with possible total scores in the range of 7–35. Higher scores represent more fear.

The COVID stress scale

It was validated in Turkish [8] and evaluates COVID-19-related stress during the pandemic. It includes 8 subheadings and a total of 36 items that are evaluated on a 5-point Likert scale. In our study, scoring was performed as previously described [8]. Higher scores represent more stress.

Ethics statement

After obtaining permission from the Ministry of Health (2021-10-22T15) for the study, it was also approved by the Erciyes University Clinical Research Ethics Committee (Date: 24 November 2021; Approval No.: 2021/753). We acted in accordance with the Declaration of Helsinki and obtained written informed consent from all patients.

Statistical analyses

The normality of data distribution was tested using the Shapiro-Wilk test. Descriptive statistics for numerical variables were expressed as mean ± standard deviation or median (interquartile range [IQR]), while those for categorical variables were expressed as numbers and percentages. Between the two independent groups, the independent samples t-test was used to compare normally distributed data, and the Mann–Whitney U test was used for non-normally distributed data. The correlation between the scores of the scales evaluating fear or stress of COVID-19 and demographic, clinical, and QoL data was evaluated with the Spearman correlation analysis. Linear regression analysis (univariable and multiple models) was used to identify the predictors that affect the COVID-19

fear and stress scores. SPSS for Windows (version 23.0, IBM Corp., Armonk, NY, USA) was used for the statistical analysis. All p-values < 0.05 were considered statistically significant.

Table 1. Demographic, clinical, and treatment-related data of the sample

	All patients (n = 100)	axSpA group (n = 69)	RA group (n = 31)	p value
Age (mean ± SD)	44.92 ± 10.26	43.54 ± 9.71	48.0 ± 10.93	0.044*
Gender [n (%)]				
Female	57 (57)	30 (43.5)	27(87.1)	<0.001*
Male	43 (43)	39 (56.5)	4 (12.9)	
BMI (mean ± SD)	29.08 ± 5.97	28.50 ± 5.73	30.36 ± 6.39	0.152
Disease duration in years (mean ± SD)	10.95 ± 7.28	9.38 ± 6.20	14.45 ± 8.34	0.004*
Number of comorbidities [median (IQR)] (min-max)	0 (1) min: 0 max: 3	0 (1) min: 0 max: 3	0 (1) min: 0 max: 3	0.445
Education [n (%)]				
< High school	80 (80)	53 (76.8)	27 (87.1)	0.289
≥ High school	20 (20)	16 (23.2)	4 (12.9)	
Smoking [n (%)]				
None	61 (61)	37 (53.6)	24 (77.4)	0.042*
Current smoker	39 (39)	32 (46.4)	7 (22.6)	
BASDAI (mean ± SD)	–	3.38 ± 2.23	–	–
ASDAS-CRP (mean ± SD)	–	2.23 ± 0.98	–	–
DAS28-CRP (mean ± SD)	–	–	3.48 ± 1.19	–
SDAI [median (IQR)]	–	–	14.7 (8.40)	–
CDAI [median (IQR)]	–	–	10 (9)	–
bDMARD [n (%)]				
Yes	77 (77)	54 (78.3)	23 (74.2)	0.849
No	23 (23)	15 (21.7)	8 (25.8)	
Hospital visits, number/21 months [median (IQR)]	4 (7)	4 (7)	2 (5)	0.020*
Total number of COVID-19 vaccine doses [median (IQR)]	3 (1)	2 (1)	3 (2)	0.015*

*p < 0.05; ASDAS: Ankylosing Spondylitis Disease Activity Score; axSpA: axial spondyloarthritis; BASDAI: Bath Ankylosing Spondylitis Disease Activity Index; bDMARD: biologic disease-modifying antirheumatic drug; BMI: body mass index; CCP: cyclic citrullinated peptide; CDAI: Clinical Disease Activity Index; CRP: C-reactive protein; DAS: Disease Activity Score; ESR: erythrocyte sedimentation rate; HLA: human leukocyte antigen; IQR: interquartile range, max: maximum, min: minimum, MTX: methotrexate; RA: rheumatoid arthritis; RF: rheumatoid factor; SD: standard deviation; SDAI: Simplified Disease Activity Index.

Results

A total of 100 patients (69 axSpA and 31 RA) met the inclusion criteria. The mean age of the sample was 44.92 ± 10.26, and 57% of the patients were female. The female gender was higher in the RA patients than in the axSpA (p < 0.001). While in the RA group the mean disease duration (p = 0.004) and the median number of COVID-19 vaccine doses (p = 0.015) were higher, the rate of smokers (p = 0.042) and the number of hospital visits (p = 0.020) were higher in the axSpA group. Other demographic, clinical, and treatment-related features of the patients are shown in Table 1. As for QoL, the mean ASQoL score was 7.53 ± 5.71 and the mean RAQoL score was 13.16 ±8.44. We did not find any significant difference between axSpA

Table 2. Quality of life, emotional status, and COVID-19-related fear and stress data

	All patients (n = 100)	AxSpA group (n = 69)	RA group (n = 31)	p value
ASQoL (mean ± SD)	–	7.53 ± 5.71	–	–
RAQoL (mean ± SD)	–	–	13.16 ± 8.44	–
HADS [median (IQR)]				
Anxiety	7 (6.75)	7 (7)	6 (6)	0.251
Depression	6 (7)	7 (7)	6 (5)	0.092
SF-36 (mean ± SD)				
PCS	49.51 ± 24.95	48.37 ± 25.77	52.05 ± 23.23	0.498
MCS	52.27 ± 22.77	50.42 ± 23.58	56.37 ± 20.63	0.229
Fear of COVID-19 scale scores [median (IQR)]	14 (12)	14 (10.5)	15 (12)	0.627
COVID-19 stress scale scores [median (IQR)]				
Total	38 (44)	38 (41.5)	41 (47)	0.932
COVID-19 danger	17.5 (18.7)	16 (18)	18 (21)	0.474
Socio-economic	0 (6)	0 (6)	1 (5)	0.971
Traumatic stress	3 (7)	3 (8)	2 (7)	0.515
Xenophobia	11 (13.7)	11 (12)	6 (16)	0.428
Compulsive checking	4 (9.2)	4 (9)	5 (8)	0.550

ASQoL: ankylosing spondylitis quality of life; axSpA: axial spondyloarthritis; HADS: hospital anxiety and depression scale; IQR: interquartile range, MCS: mental component summary; PCS: physical component summary; RA: rheumatoid arthritis; RAQoL: rheumatoid arthritis quality of life; SF-36: short form-36.

Table 3. Identification of potential predictors of COVID-19 fear scores and COVID-19 stress scores

	Univariable model for COVID-19 fear				Univariable model for COVID-19 stress			
	β	95% CI		p-value	β	95% CI		p-value
Age	0.120	-0.060	0.239	0.236	0.306	0.313	1.350	0.002*
BMI	0.188	-0.011	0.497	0.061	0.205	0.039	1.872	0.041
Female	-0.032	-3.605	2.607	0.751	-0.019	-12.329	10.144	0.847
Disease (RA/Reference: axSpA)	0.031	-2.807	3.844	0.758	0.010	-11.426	12.633	0.921
Disease duration	0.056	-0.153	0.271	0.581	0.232	0.141	1.635	0.020*
Presence of comorbidity (Yes/ Reference: No)	0.113	-1.389	5.066	0.261	0.019	-10.641	12.846	0.853
Education (≥ high school/ Reference: < high school)	-0.082	-5.409	2.259	0.417	-0.119	-22.049	5.574	0.239
Current smoker (Yes/ Reference: No)	0.043	-2.470	3.833	0.669	-0.067	-15.215	7.547	0.505
Total number of hospital visits	0.088	-0.176	0.453	0.385	0.050	-0.856	1.424	0.622
bDMARD (Yes/ Reference: No)	0.000	-3.655	3.658	0.999	-0.046	-16.258	10.156	0.648
HADS-A	0.310	0.185	0.776	0.002*	0.269	0.423	2.589	0.007*
HADS-D	0.303	0.209	0.924	0.002*	0.207	0.076	2.729	0.038*
SF-36/PCS	-0.180	-0.116	0.005	0.074	-0.152	-0.392	0.051	0.130
SF-36/MCS	-0.092	-0.099	0.037	0.363	-0.184	-0.467	0.016	0.067
Total number of COVID-19 vaccines	0.322	0.738	3.306	0.002*	0.197	-0.339	9.516	0.068

*p < 0.05
axSpA: axial spondyloarthritis; bDMARD: biologic disease-modifying antirheumatic drug; BMI: body mass index; CI: confidence interval; HADS: hospital anxiety and depression scale (A: anxiety; D: depression); SF-36: short form-36; PCS: physical component summary; MCS: mental component summary; RA: rheumatoid arthritis.

and RA patients in terms of QoL, anxiety, depression, fear of COVID-19, and COVID-19 stress ($p > 0.05$ for all; Table 2). As for the relationships between the collected data and COVID-related impacts, there was a weak correlation between the fear of COVID-19 scores and RAQoL ($r = 0.3904$, $p = 0.030$), anxiety ($r = 0.3028$, $p = 0.002$), depression ($r = 0.3066$, $p = 0.002$), and the number of COVID-19 vaccine doses ($r = 0.3131$, $p = 0.003$). While the COVID-19 stress scores showed a moderate relationship with RAQoL ($r = 0.5311$, $p = 0.002$), they weakly correlated with age ($r = 0.3459$, $p < 0.001$), body mass index ($r = 0.2073$, $p = 0.039$), disease duration ($r = 0.2047$, $p = 0.041$), SDAI ($r = 0.3835$, $p = 0.033$), CDAI ($r = 0.3612$, $p = 0.046$), and anxiety ($r = 0.2115$, $p = 0.035$) (Data not shown).

In linear regression analyses, we first applied a univariate model to identify candidate predictors (Table 3). Then, we included the candidate predictors in a multiple model. After adjusting for the effects of other factors (age, body mass index, comorbidity status, and the number of hospital visits) in the enter model, anxiety (β: 0.358, 95% confidence interval (CI): 0.234-0.817, $p = 0.001$) and COVID vaccine doses (β: 0.230, 95% CI: 0.391-3.271, $p = 0.013$) were the two predictors that had a significant effect on the fear of COVID scores. When we evaluated the COVID-19 stress scores with a similar method, age (β: 0.289, 95% CI: 0.179-1.401, $p = 0.012$) and anxiety (β: 0.286, 95% CI: 0.772-2.809, $p = 0.001$) were the two significantly effective predictors after adjusting for the effects of other factors (body mass index, disease duration, and the number of COVID vaccines) in the enter model (for all; data not shown). In correlation analyses, there was a moderate-to-strong correlation between anxiety, depression, and both PCS and MCS of the SF-36 scale (Data not shown). Therefore, depression, PCS, and MCS, which were less associated with the scores of COVID-19-related fear and stress compared to anxiety, were not included in the multiple model.

Discussion

This study revealed that anxiety was an important predictor for both fear of COVID-19 and COVID-19 stress scores in individuals with two different major rheumatic diseases (AxSpA or RA) during the COVID-19 outbreak. In addition, the number of COVID-19 vaccine doses notably affected the fear of COVID-19 scores, and age significantly affected the COVID-19 stress scores.

After the rapid spread of severe acute respiratory syndrome coronavirus 2 over the world, the combination of high mortality, negative effects on health systems, and economic consequences had devastating effects on humanity [14]. Indisputably, death is the most negative outcome of the pandemic. However, the pandemic has brought with it consequences in physical, psychological, economic, and social aspects for all humanity that cannot be ignored. Considering the past pandemic experiences, speculations concerning the effects of COVID-19 on psychological health have been formed. For example, after the Severe Acute Respiratory Syndrome outbreak in 2003, the prevalence of psychological problems such as post-traumatic stress disorder, anxiety, and depression increased [14-16].

As the COVID-19 outbreak began to show its effects in different countries, healthcare professionals carried out studies focusing on the mental health or psychological responses of individuals and/or patient groups with different characteristics. Fear, one of the reactions that normally allows us to survive, can reach harmful dimensions as a result of various negative situations (e.g., social isolation, uncertainty, financial problems, loss of family members due to COVID-19, being part of a high-risk age group, having a chronic disease, etc.), such as the COVID-19 pandemic, and can seriously affect rational decision making [17]. Warren et al. [16] reported that anxiety sensitivity was associated with COVID-19 fear. On the other hand, Asmundson et al. [18] showed that the scores on the COVID stress scale were affected by mood disorders (e.g., anxiety disorder, panic disorder, etc.). They also revealed that these scores were higher in the early stages of the pandemic and decreased after the spread of vaccines in the later stages. In the current study, anxiety scores correlated with the scores of the COVID-19 fear and stress scales. Additionally, as determined by the regression analysis, anxiety was a significant risk factor for COVID-19 fear and stress. This result is compatible with the above- mentioned studies showing that anxiety was associated with COVID-19-related fear and stress. Scores obtained from both the emotional status and COVID-19 scales did not differ significantly in axSpA and RA patients. In both diseases, it can be said that anxiety affects COVID-19 fear and stress similarly. There was also a weak relationship between the COVID-19 vaccine doses and the COVID fear scores. Moreover, the number of COVID-19 vaccine doses was an important predictor of COVID-19 fear scores. This finding may be related to the fact that patients request more vaccine doses if they experience more fear, in line with the results presented by Håkansson et al. [19].

Previous studies on inflammatory rheumatic diseases revealed that psychiatric comorbidities are related to higher disease activity and worse QoL due to changes in pain tolerance [20]. Higher levels of isolation during the pandemic resulted in worse self-reported disease activity and social and mental well-being in these patients [21]. Hassan et al. [20] reported that factors such as disease activity, disease duration, and functional status had an impact on the QoL of RA patients during the pandemic. Additionally, they identified a strong relationship between fear of COVID-19 and psychological symptoms. However, Bhatia et al. [22] emphasized that it is not clear whether this situation is due to disease-related parameters of RA patients who are at high risk for deterioration of mental health during the pandemic. In our study, the scores obtained from the scales assessing QoL, mood, and COVID-19 fear/stress were similar in both rheumatic diseases. Disease activity of RA measured by SDAI and CDAI weakly correlated with COVID-19 stress. However, there was a moderate positive relationship between RAQoL and COVID-19 stress. The potential of RAQoL to affect disease activity scores should also be considered. As a result, QoL in RA patients might have a greater effect on COVID-19 stress than disease activity. Moreover, the further isolation during the pandemic may have affected the QoL of these patients.

Age is thought to play a remarkable role in the perceived risk of COVID-19 infection. Mistry et al. [23] noted that elderly people in Bangladesh had a significant fear of COVID-19 and needed mental support. Conversely, Andrade et al. [24] reported a higher fear of COVID-19 in younger individuals. In our study, age

and the COVID-19 stress scores had a low positive correlation, while age was a predictor of the COVID-19 stress scores with a significant effect in the multiple linear regression model. Due to the increased possibility of comorbidities in older age [25], we examined whether comorbidities affected the evaluated scale scores, but no significant effect was found. The exposure of the elderly to isolation may have also impacted COVID-19-related stress. As we mentioned earlier, isolation due to the pandemic could have increased stress by decreasing QoL [21].

The strength of the study is that it provides multidimensional assessments of COVID-19-related fear and stress, taking into account factors such as disease activity, QoL, anxiety, depression, hospital visits, and vaccination status. However, this study has some limitations. First, most of the collected data were based on self-report scales and questionnaires. Additionally, healthy volunteers were not included as a control group. Last, the fact that our study was cross-sectional and did not contain similar data from the pre-pandemic period prevented us from making relevant comparisons.

Conclusion

This study showed that anxiety is an independent risk factor for COVID-19-related fear and stress scores in individuals with AxSpA and RA. Age and COVID-19 vaccine doses were other important predictors affecting the fear of COVID-19 and COVID-19 stress scores, respectively. COVID-19-related fear or stress, QoL, anxiety, depression, disease activity, and the number of vaccine doses potentially interact with each other, and there is confusion as to which are pre-existing and which might trigger the other(s). The overall health of this patient group is the common goal for rheumatologists, and factors, including the pandemic, that possibly affect all sub-components of health should continue to be investigated to improve rheumatic patients' well-being.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and Human Rights Statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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This study was approved by the Ethics Committee of Erciyes University Clinical Research Ethics Committee (Date: 2021-11-24, No: 2021/753)